



# ***STIC Search Report*** **EIC 2800**

**STIC Database Tracking Number: 130835**

**TO: Raymond Alejandro**  
**Location: REM 6B59**  
**Art Unit : 1745**  
**Friday, September 17, 2004**

**Case Serial Number: 10/009104**

**From: Scott Hertzog**  
**Location: EIC 2800**  
**JEF4B68**  
**Phone: 272-2663**

**Scott.hertzog@uspto.gov**

## **Search Notes**

Examiner Alejandro,

Attached are edited first pass search results from the patent and nonpatent databases.

Colored tags indicate abstracts especially worth your review.

If you need further searching or have questions or comments, please let me know.

Thanks,  
Scott Hertzog

## SEARCH REQUEST FORM

Scientific and Technical Information Center

Requester's Full Name: Raymond Alejandro Examiner #: 76895 Date: 08/25/04  
Art Unit: 1745 Phone Number 302-1282 Serial Number: 101009104  
Mail Box and Bldg/Room Location: Room 66-59 Results Format Preferred (circle): PAPER DISK E-MAIL

If more than one search is submitted, please prioritize searches in order of need.

\*\*\*\*\*

Please provide a detailed statement of the search topic, and describe as specifically as possible the subject matter to be searched. Include the elected species or structures, keywords, synonyms, acronyms, and registry numbers, and combine with the concept or utility of the invention. Define any terms that may have a special meaning. Give examples or relevant citations, authors, etc, if known. Please attach a copy of the cover sheet, pertinent claims, and abstract.

Title of Invention: Battery having a housing for electronic circuitryInventors (please provide full names): Gartstein et alEarliest Priority Filing Date: 03/20/02

\*For Sequence Searches Only\* Please include all pertinent information (parent, child, divisional, or issued patent numbers) along with the appropriate serial number.

Please, search for subject matter of claims 1-10.  
See attached copy.

\*\*\*\*\*  
STAFF USE ONLY

	Type of Search	Vendors and cost where applicable
Searcher: <u>Scott HERTZOG</u>	NA Sequence (#) _____	STN <u>✓</u>
Searcher Phone #: <u>2-2663</u>	AA Sequence (#) _____	Dialog _____
Searcher Location: <u>JEF 4A58</u>	Structure (#) _____	Questel/Orbit _____
Date Searcher Picked Up: <u>9/16/04</u>	Bibliographic <u>✓</u>	Dr.Link _____
Date Completed: <u>9/17/04</u>	Litigation _____	Lexis/Nexis _____
Searcher Prep & Review Time: <u>180</u>	Fulltext _____	Sequence Systems _____
Clerical Prep Time: <u>✓</u>	Patent Family _____	WWW/Internet _____
Online Time: <u>159</u>	Other _____	Other (specify) _____

INDEX 'HCAPLUS, INSPEC, COMPENDEX, SCISEARCH, PASCAL, ELCOM, ENERGY, AEROSPACE, DISSABS, METADEX, ANTE, NTIS, CEABA-VTB, CONFSCI, EMA, ENTEC, FEDRIP, RDISCLOSURE, SIGLE' ENTERED AT 09:38:32 ON 17 SEP 2004

L1 QUE COMPARTMENT? OR CONTAIN? OR HOUS? OR  
PROTECT? OR RELIAB?(3N) CONNECT? OR REPLAC? OR MAINTAIN?  
L2 QUE CIRCUIT? OR INDICAT? OR ELECTR?(2N) (CONNECT? OR COMPONENT? OR  
DEVICE?)  
L3 QUE BATTER? OR PILE? OR CELL OR (ELECTR? OR POWER?) (2N) SOURCE  
L4 QUE L1 AND L2 AND L3  
L5 QUE COMPARTMENT? OR CONTAIN? OR HOUS? OR PROTECT? OR REPLAC? OR  
MAINTAIN?  
L6 QUE L4 AND L5  
L7 QUE INDICAT? OR IDENTIFI?  
L8 QUE L6 AND L7  
L9 QUE COMPARTMENT? OR CONTAINER? OR CONTAINRE?  
OR HOUSING? OR PROTECT? OR REPLAC? OR MAINTAIN?  
L10 QUE L8 AND L9  
L11 QUE BATTER?  
L12 QUE L10 AND L11  
L13 QUE (INDICAT? OR IDENTIFI?)/TI,AB  
L14 QUE (INDICAT? OR IDENTIFI?)/TI  
L15 QUE L12 AND L14

FILE 'HCAPLUS, ENERGY, INSPEC, NTIS, SCISEARCH, RDISCLOSURE, COMPENDEX, PASCAL, ENTEC, AEROSPACE, DISSABS, CEABA-VTB, FEDRIP, SIGLE' ENTERED AT 10:51:30 ON 17 SEP 2004

L16 127 S L15  
L17 111 DUP REM L16 (16 DUPLICATES REMOVED)  
L18 51 S L17 AND P/DT  
L19 53 S L17 NOT P/DT NOT PD>19990621  
L20 49 S L19 NOT P/DT NOT PY>1999  
L21 26 S BATTER?/TI AND L20  
L22 30 S L18 AND AD<2000  
L23 3947865 S COMPARTMENT? OR HOUSING? OR PROTECT? OR  
REPLAC? OR MAINTAIN?  
L24 20 S L22 AND L23  
L25 26 S L23 AND L21

SET ABB=ON PLU=ON

INDEX 'WPIX, JAPIO, JICST-EPLUS, PATOSEP' ENTERED AT 12:44:56 ON 17 SEP 2004

L1 QUE COMPARTMENT? OR CONTAIN? OR HOUS? OR  
PROTECT? OR RELIAB?(3N) CONNECT? OR REPLAC? OR MAINTAIN?  
L2 QUE CIRCUIT? OR INDICAT? OR ELECTR?(2N) (CONNECT? OR COMPONENT? OR  
DEVICE?) OR TEST?  
L3 QUE BATTER? OR PILE? OR CELL OR (ELECTR? OR POWER?) (2N) SOURCE  
L4 QUE RETAIN? OR KEEP? OR HOLD?  
L5 QUE COMPARTMENT? OR HOUSING? OR REPLACEAB? OR MAINTAIN?  
L6 QUE L1 AND L2 AND L3 AND L4 AND L5  
L7 QUE L6 AND BATTER?/TI  
L8 QUE L7 AND (TEST? OR INDICAT?)/TI  
L9 QUE L8 AND (H01M? OR H02J?)/IC  
FILE 'WPIX' ENTERED AT 13:51:16 ON 17 SEP 2004  
L10 16 S L9

☐ L24 ANSWER 1 OF 20 HCAPLUS COPYRIGHT 2004 ACS on STN

## Accession Number

2001:347375 HCAPLUS Full Text

## Title

*On cell circumferential battery indicator*

## Author/Inventor

Kacprowicz, Mark; Lynch, Anne T.; Gordon, Eric S.; Klein, David N.

## Patent Assignee/Corporate Source

The Gillette Company, USA

## Patent Information

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 6232782	B1	20010515	1999-293040	19990416 <--

## Abstract

A **battery** includes a **battery** tester including a display that is disposed around a substantial portion of the circumference of the **battery**. Also describe is a **battery** operated **electronic device** including a case that **houses electronic components** that comprise the **electronic device**, said case including a door that opens up to a **battery compartment**, with the door having at least a transparent window portion in the door.

## International Patent Classification

ICM G01N027-416

☐ L24 ANSWER 2 OF 20 HCAPLUS COPYRIGHT 2004 ACS on STN

## Accession Number

2001:140411 HCAPLUS Full Text

## Title

*System for automatically indicating that battery should be replaced and method thereof*

## Author/Inventor

Kim, Ji-sang

## Patent Assignee/Corporate Source

Samsung Electronics Co., Ltd., S. Korea

## Patent Information

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 6194870	B1	20010227	1999-415225	19991012 <--

## Priority Application Information

KR 1998-42178 A 19981009

## Abstract

A system of automatically **indicating** a user that it is time to **replace** a rechargeable **battery** of an electric apparatus includes a **battery** state detector for detecting whether the **battery** is in a low **battery** state, a **battery** output detector for detecting electrical capacity of the **battery** which is consumed in the electric apparatus, and a power controller for defining an electrical capacity of the **battery** to be considered as the life of the **battery** is over, as a reference electrical capacity for **replacement**, calculating a total consumed electrical capacity value of the **battery** by accumulating an electrical capacity value detected by the **battery** output detector when the **battery** is in the low **battery** state, and generating a **battery replacement** signal when the total consumed electrical capacity value is equal to or less than the reference electrical capacity for **replacement**. Thus, when an electric apparatus including a rechargeable **battery** is used, since a user is automatically notified of the time to **replace** the rechargeable **battery**, not depending on one's experience, damage such as data loss can be prevented.

## International Patent Classification

ICM H02J007-14

ICS G01N027-416

☐ L24 ANSWER 4 OF 20 HCAPLUS COPYRIGHT 2004 ACS on STN

## Accession Number

1999:603164 HCAPLUS Full Text

## Title

*Temperature sensing device for permanently indicating when a product is exposed to critical temperatures*

## Author/Inventor

Bullock, Norma Kathryn; Kuipers, Roy

## Patent Assignee/Corporate Source

Lucent Technologies Inc., USA

## Patent Information

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 5954010	A	19990921	1996-716117	19960919 <--

## Abstract

A temperature sensing device for permanently **indicating** when a product is exposed to ambient temperatures exceeding a maximum permitted temperature of the product for a time period long enough to permanently damage the product.. In an exemplary embodiment, the temperature sensing device is typically located on the **protective** cover of a **battery** away from terminals and the **battery** casing. The temperature sensing device is made of a material to permanently expand and/or shrink upon reaching critical temperatures (e.g. too hot). The expansion is visually detectable by means of a visual **indicator** and/or reference point.

## International Patent Classification

ICM G01K011-06

☐ L24 ANSWER 5 OF 20 HCAPLUS COPYRIGHT 2004 ACS on STN

## Accession Number

1997:616953 HCAPLUS Full Text

## Title

*Mixed cathode formulation for achieving end-of-life indication*

## Author/Inventor

Ebel, Steven J.; Smesko, Sally Ann; Takeuchi, Esther S.

## Patent Assignee/Corporate Source

Wilson Greatbatch Ltd., USA

## Patent Information

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 5667916	A	19970916	1996-644452	19960510 <--

## Abstract

**Battery** -powered implantable medical devices require a suitable method for **indicating** end-of-service of the **power source** so that there is ample time for elective **replacement** of the device and/or **power source**. The mixed cathode materials preferably comprise a major portion of a fluorinated C and a minor portion of a metal-**containing** material. The mixed cathode formulation is characterized by 2, discretely different operating voltages, the 2nd of which may be used as an end-of-life **indicator**. The minor cathode constituent is selected from Bi2O3, Bi2Pb2O5, CuS, CuCl2, CuO, FeS, FeS2, MoO3, Ni3S2, Ag2O, AgCl, CuV2O5, Cu-Ag-V oxide, and/or HgO.

**Controlled or Index Terms**Primary **batteries**(for implantable medical devices with end-of-life **indication** )**Battery** cathodes(mixed formulation for achieving end-of-life **indication** )

1317-40-4, Copper sulfide (CuS) 20667-12-3, Silver oxide (Ag2O)

RL: DEV (Device component use); USES (Uses)

(in mixed **battery** cathode formulation of fluorinated carbon  
for achieving end-of-life **indication** )1304-76-3, Bismuth oxide (Bi2O3), uses 1313-27-5, Molybdenum oxide  
(MoO3), uses 1317-37-9, Iron sulfide (FeS) 1317-38-0, Cupric oxide,  
uses 7447-39-4, Copper chloride (CuCl2), uses 7783-90-6, Silver  
chloride (AgCl), uses 12035-72-2, Nickel sulfide (Ni3S2) 12068-85-8,  
Iron sulfide (FeS2) 12158-65-5, Copper vanadium oxide (CuV2O5)  
12356-42-2, Bismuth lead oxide (Bi2Pb2O5) 21908-53-2, Mercury oxide  
(HgO) 181183-66-4, Copper silver vanadium oxide

RL: MOA (Modifier or additive use); USES (Uses)

(in mixed **battery** cathode formulation of fluorinated carbon  
for achieving end-of-life **indication** )

11113-63-6, Graphite fluoride

RL: DEV (Device component use); USES (Uses)

(mixed **battery** cathode formulation for achieving end-of-life  
**indication** )**Supplementary Terms****battery** cathode end of life **indicator** ; fluorinated carbon mixed formulation**battery** cathode; metal oxide mixed formulation **battery** cathode; implantable  
medical device **battery** cathode**International Patent Classification**

ICM H01M004-02

☐ **L24 ANSWER 7 OF 20 HCAPLUS COPYRIGHT 2004 ACS on STN****Accession Number**1981:147528 HCAPLUS Full Text**Title****Lithium halide primary cell having end of life indicator means****Author/Inventor**

O'boyle, Matthew

**Patent Assignee/Corporate Source**

Catalyst Research Corp., USA

**Patent Information**

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 4247607	A	19810127	1980-144329	19800428 <--

**Abstract**

This button-type **battery** especially for cardiac pacemakers incorporates an **indicator** by which a physician is alerted in time to **replace** this **power source** for the pacemaker. When 5-15% of the Li anode remains unused there is a sudden increase in the internal impedance of the **cell** and this increase is detectable by a physician observing a significant drop in the heart stimulation afforded by the pacer device. On the anode there is a stepped portion on the major surface not in contact with the depolarizer and this stepped portion is 5-15% of the total thickness of the anode and has a surface area of .apprx.40-60% of the surface area of the major surface in contact with the depolarizer.

**Controlled or Index Terms**

Electric impedance

(of lithium **batteries** for pacemakers, end of life in relation to)

Heart

(pacemaker, lithium **batteries** for, with end of life **indicator** means)

**Batteries** , primary

(pacemaker, lithium, with end of life **indicator** means)

7439-93-2, uses and miscellaneous

RL: USES (Uses)

(anodes, in primary **batteries** , with end of life **indicator** means)

#### Supplementary Terms

lithium **battery** impedance detection exhaustion; pacemaker lithium **battery** impedance exhaustion

#### International Patent Classification

H01M004-36

#### ☐ L24 ANSWER 8 OF 20 HCAPLUS COPYRIGHT 2004 ACS on STN

##### Accession Number

1968:60851 HCAPLUS Full Text

##### Title

**Specific gravity indicator**

##### Author/Inventor

Suematsu, Kensho

##### Patent Assignee/Corporate Source

Japan Storage Battery Co., Ltd.

##### Patent Information

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 3340736		19670912		19640915 <--

##### Abstract

A device for continuously **indicating** the sp. gr. of the H2SO4 in a storage **battery** consists of a polystyrene float pivoted at one end and **containing** a Pb insert so that the angle with the horizontal at which the float rests **indicates** the sp. gr. of the acid. The device is mounted in a **compartment** at one side of the **battery** inside a transparent wall that permits circulation of the acid without admittance of gas bubbles generated by the action of the **battery**.

##### Controlled or Index Terms

Density

(determination of, apparatus for, with pivoted buoyant element)

**Batteries** , secondary

(electrolyte d. in, apparatus for determining)

7664-93-9, properties

RL: PRP (Properties)

(density of, apparatus for determining, in storage **batteries** )

##### Supplementary Terms

APP; APP; APP; SPECIFIC GRAVITY STORAGE **BATTERIES** ; STORAGE **BATTERIES** SPECIFIC GRAVITY; **BATTERIES** STORAGE SPECIFIC GRAVITY

#### ☐ L24 ANSWER 9 OF 20 ENERGY COPYRIGHT 2004 USDOE/IEA-ETDE on STN

##### Accession Number

1989(14):92219 ENERGY Full Text

##### Title

**State of discharge indicator for a battery. Entladezustandsanzeige fuer eine**



**Batterie.****Author/Inventor**

Lang, G. [Germany, Federal Republic of]

**Patent Assignee/Corporate Source**

Braun A.G., Frankfurt am Main (Germany, F.R.) Assignee(s): Braun A.G., Frankfurt am Main (Germany, F.R.).

**Patent Information**

DE 3622991 A1 21 Jan 1988 5 p.

**Abstract**

A circuit for indicating the state of discharge of a battery is claimed. The battery voltage is measured automatically at the working load, without needing a battery test pushbutton. The user can see in good time when the battery has to be recharged. As the arrangement is self-operating, no external control is necessary. It is therefore distinguished by simple construction and low manufacturing costs. The current consumption for indication when the battery has to be recharged or replaced is small. The circuit only starts and the indication device only responds, when one drops below the set threshold of battery voltage.

**Controlled or Index Terms**

\*ELECTRIC BATTERIES; \*CHARGE STATE; \*CHARGE STATE; \*DISPLAY DEVICES;  
ELECTRIC DISCHARGES; ELECTRONIC CIRCUITS; TRANSISTORS  
BT ELECTROCHEMICAL CELLS; SEMICONDUCTOR DEVICES

**International Patent Classification**

G01R031-36; H02M003-155; H01M010-48

☐ **L24 ANSWER 12 OF 20 ENERGY COPYRIGHT 2004 USDOE/EA-ETDE on STN****Accession Number**

1985(16):112913 ENERGY

**Title*****Battery charge indicator.*****Author/Inventor**

Bertolino, R. Z. [United States]

**Patent Information**

US 4497881 5 Feb 1985

**Abstract**

An electrical storage cell includes a charge producing compound in the interior of the cell which inherently and without the addition of additives or structure changes color as the charge of the battery is dissipated. The battery includes a window in either the top or the side of the battery to provide visual access to the charge producing compound. A suitable color chart is positioned around the window through the battery housing to enable an observer to see the charge producing compound in the interior of the battery and to compare the color of that charge producing compound against a color on the comparison chart to determine the battery charge remaining in the battery.

**Controlled or Index Terms**

\*MEASURING INSTRUMENTS; \*ELECTRIC BATTERIES; \*CHARGE STATE; BATTERY  
CHARGING; COLOR  
BT ELECTROCHEMICAL CELLS; OPTICAL PROPERTIES; ORGANOLEPTIC PROPERTIES;  
PHYSICAL PROPERTIES

**International Patent Classification**

H01M010-48

☐ L25 ANSWER 4 OF 26 ENERGY COPYRIGHT 2004 USDOE/IEA-ETDE on STN

## Accession Number

1985(10):67553 ENERGY

## Title

*Improved battery state-of-charge indicator. Final supplemental report.*

## Author/Inventor

Anon. [United States]

## Patent Assignee/Corporate Source

Gould, Inc., Rolling Meadows, IL (USA). Electronic and Computer Systems Lab.

## Number of Components

AI01-78CS54209 NR DOE/CS/54209--25; JPL--9950-970; DE85006661 30 Sep 1984. 151 p. Availability: NTIS, PC A08; 3.; GPO Dep. Paper copy only, copy does not permit microfiche production. Original copy available until stock is exhausted.

## Abstract

The improved SCI system developed during Modification Number 5 of this contract successfully fulfilled the target performance goals. The improved battery parameter adaptor will track the aging of the battery with a high degree of confidence. The values installed in the starting battery parameter array do have to be qualified to insure SOC accuracy. Furthermore, the battery charger and SCI interface handshaking communications must be maintained to allow proper operation of the SCI. Some recommendations are suggested for future high performance eV state-of-charge indicators.

☐ L25 ANSWER 8 OF 26 INSPEC (C) 2004 IEE on STN

## Accession Number

1995:5056757 INSPEC DN A9520-8630E-003; B9511-8410C-003 Full Text

## Title

*State-of-charge indicators (batteries).*

## Author/Inventor

Atwater, T.B. (Electron. &amp; Power Sources Directorate, US Army Res. Lab., Fort Monmouth, NJ, USA)

## Source

1994 IEEE MILCOM. Conference Record (Cat. No.94CH34009) New York, NY, USA: IEEE, 1994. p.203 vol.1 of 3 vol. xxxix+1052 pp. 0 refs. Conference: Fort Monmouth, NJ, USA, 2-5 Oct 1994 Sponsor(s): IEEE Commun. Soc.; Armed Forces Commun.; Electron. Assoc Price: CCCC 0 7803 1828 5/94/\$4.00 ISBN: 0-7803-1828-5

## Abstract

Summary form only given. Prediction of the capacity remaining in used **batteries** is important information to the user. Each year millions of dollars are spent on **batteries** for use in portable electronics equipment. In order to **maintain** readiness, users currently **replace batteries** on a conservative schedule. This practice results in the waste of millions of dollars in **battery** energy every year--approximately 40 percent of available **battery** capacity. For many **battery** systems there is no convenient method of determining the available capacity remaining in partially used **batteries**; hence, users do not take full advantage of all the available **battery** energy. Knowledge of capacity remaining in used **batteries** results in their better utilization. It is a well documented and accepted that the available capacity in a **battery** is a function of the conditions that the **battery** has been subjected. Capacity remaining is a complex function of current drain, temperature and time. A continuous internal means of determining remaining capacity is desirable. These internal methods require extensive calibration and in many cases are difficult to implement. The pursuit of a universal state-of-charge **indicator** has been elusive due to the variation in behavior of **battery** systems. Reliable methods of predicting remaining

capacity has been actively sought. This presentation describes different methods of determining **battery** state-of-charge and the application of these methods to different **battery** systems.

☐ L25 ANSWER 14 OF 26 INSPEC (C) 2004 IEE on STN

Accession Number

1978:1168814 INSPEC DN B78016133 Full Text

Title

**Battery condition indicator.**

Author/Inventor

Langton, A.

Source

Practical Electronics (Dec. 1977) vol.14, no.4, p.277. 0 refs. CODEN: PRELBY  
ISSN: 0032-6372

Abstract

The **circuit** was designed to **replace** an expensive meter in a radio control transmitter.

☐ **L10 ANSWER 14 OF 16 WPIX COPYRIGHT 2004 THOMSON DERWENT on STN**

## Accession Number

1985-242535 [39] WPIX Full Text

## Title

***Lithium alloy iron sulphide battery - has positive and negative subassemblies designed to allow testing before introducing electrode materials.***

## Author/Inventor

KAUN, T D

## Patent Assignee/Corporate Source

(USAT) US DEPT ENERGY

## Patent Information

PATENT NO.	KIND	DATE	WEEK	LA	PG	MAIN IPC
US 4540642	A	19850910	(198539)*		9	
US 595203	A0	19851008	(198603)			

## Abstract

US 4540642 A UPAB: 20011211

An Li alloy/Fe sulphide **battery** comprises (a) a sealed outer **housing containing** positive and negative current collector subassemblies (50,60) having spaced mutually paired perforated faces, with the positive electrode subassembly secured to the **housing** so its major faces are spaced from the **housing** walls; (b) positive electrode material (57) confined and sealed between the **housing** and faces of the positive electrode subassembly; (c) a separator (70) between the positive and negative current collector subassemblies, electrically insulating them from each other and supporting the negative electrode subassembly within the positive subassembly; and (d) negative electrode material (67) confined and sealed within the negative electrode subassembly.

ADVANTAGE - The structure can be mfd. at room temperature The subassemblies may be secured within the **housing** and pretested for shorts etc. before adding electrode material etc., e.g. by extrusion, and sealing the **cell**. The structure provides a high specific energy **cell**. A pref. structure minimises the damaging effects of swelling on charge and discharge.

Dwg. 4/6

## Abstract, Equivalent

GB 2157065 B UPAB: 19930925 A lithium alloy/iron sulphide **cell** or **battery**, comprising an exterior **housing**, positive and negative current collector subassemblies disposed in the **housing** and having spaced mutually paired perforated faces, means securing the positive current collector subassembly to the **housing** operable to **hold** its major faces spaced from the **housing**, positive electrode material confined between the **housing** and the perforated faces of the positive electrode subassembly and means to seal the positive electrode material therein, separator means disposed between the positive and negative current collector subassemblies for electrically insulating them from one another and also supporting the negative current collector subassembly within and relative to the positive current collector subassembly, negative electrode material confined within the negative electrode subassembly and means to seal the negative electrode materials therein, and means to seal the **housing**.

US 6595203 A UPAB: 19930925 A **cell** has loop-like positive and negative sheet metal current collectors electrically insulated by separators, and the positive outwardly of the negative. Separate chambers outwardly of the positive and inwardly of the negative collector open in opposite directions towards the **cell housing** open ends through which the electrode materials can be extruded into the **cell** after which the **cell** is sealed closed. A cross-wall reinforces the **housing** and defines two cavities with pairs positive and negative collectors in each cavity and connected in parallel. The collectors are initially secured within the open-ended **housing** for pretesting by electrical shorts. ADVANTAGE - Provides high specific energy output and improved operating life, any charge-discharge cycle swelling of the positive electrode material being inwardly against only the positive collector to minimise shorts due to mutual shifting of the collectors.

## International Patent Classification

H01M002-14 ; H01M010-39

☐ L10 ANSWER 16 OF 16 WPIX COPYRIGHT 2004 THOMSON DERWENT on STN

## Accession Number

1979-K8162B [46] WPIX Full Text

## Title

*Battery charger with liquid crystal current charge indicator - has charge current source housing containing transformer and cell -holder module containing diode.*

## Author/Inventor

BLAKE, C R; SUGALSKI, R K

## Patent Assignee/Corporate Source

(GENE) GENERAL ELECTRIC CO

## Patent Information

PATENT NO.	KIND	DATE	WEEK	LA	PG	MAIN IPC
US 4173733	A	19791106	(197946)*			

## Abstract

US 4173733 A UPAB: 19930901

The charging system is for alternatively charging **cells** having different physical sizes and/or electrical characteristics comprising a charge current source, several **cell -holder** modules and interconnection means on the charger and the modules for selective alternative connection of each of the modules to the charger.

Each module includes a liquid crystal for **indicating** when **cells** in the module are being charged. The charge current source (11) consists of a high impedonic centre-tapped transformer with two blades (12, 14) on one side of the **housing** connecting to 120V A.C.

## International Patent Classification

**H02J007-00**